MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

TAL 7011 – ARCHITECTURE OF LARGE SOFTWARE SYSTEMS

(All sections / Groups)

7 June 2017
8.00 p.m. – 10.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 6 pages (including cover page) with 5 Questions only.
2. Attempt **FOUR** out of **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1 (2 + 3 + 2 + 2 + 1 marks)

GoodProperty is a property sales agency located at the city center of Kuala Lumpur. It runs its business in a building where the registration for new property agents, enquiries of potential buyers regarding properties, and property purchase transactions are done at the ground floor at the reception area. There is one room reserved to facilitate computer systems, servers and related equipment. The rest of the spaces are allocated for show casing the properties models and information. GoodProperty's operation hours are from 9am till 6pm daily including weekends and holidays. Payment can be made in terms of cash, cheque or credit card during the office hours for deposits and purchased transactions.

The management of GoodProperty would like to develop a standalone local area network (LAN) system to support its business processes such as:

- Registration of new sales agent
- Payment for deposits and purchases
- Schedule for visits to property sites
- Generation of reports e.g., monthly sales report.

The system is to be implemented through a few networked computers at the premise of GoodProperty.

a) Based on the scenario above, describe TWO main responsibilities of the software architect for this system.

b) Determine any THREE possible influences to the architecture of this system.

c) i) Based on the information provided, identify ONE most important quality attribute for this system. Justify your answer.

ii) Based on the quality attribute you have identified in Question 1(c)(i), illustrate with a diagram, the quality attribute scenario.

iii) Describe at least ONE possible tactic to achieve the quality attribute in Question 1(c)(i).

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Question 2 (2 + 3 + 2 + 3 marks)

The company, GoodProperty, described in Question (1) above has expanded its business in recent years with a few more branches opened at different locations in Klang Valley to cater for the increased in business volumes. GoodProperty is proposing a new intranet system to manage and maintain the documentation related to all its sales and purchases transacted by every property sales agent at the different branches. Currently, all documentation is maintained manually which makes storage of huge volume of information and retrieval of accurate and up-to-date information very difficult. This new intranet system maintained by the Information Technology unit of GoodProperty, should allow ease of retrieval and efficient storage of information. Staff from all branches should be able to have access to related documentation based on level of access and authority.

a) Provide at least TWO possible architectural drivers for this system. State any assumption you have made if the information provided above is insufficient.

b) Describe how you can use the Attribute-Driven Design (ADD) to produce a coarse-grained architecture of this system.

c) Determine the criteria you can use to identify a suitable architectural pattern to expand the software architecture for this system. Based on these identified criteria, select an architectural pattern that is suitable.

d) Describe the architectural pattern identified in Question 2(c); you need to illustrate on how it can be applied to the above mentioned system.

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Question 3 (3 + 3 + 1 + 3 marks)

Me2U, a software development company, sets target to develop a web application for its online Internet users. Under this project, the company is to develop a set of integrated programs and applications in a package call All-in-OneApp. This All-in-OneApp would provide companies the facilities to advertise their products and services, and online Internet users would be able to order the products and services as well as make payment online.

a) Identify any THREE possible stakeholders of the All-in-OneApp project and create a candidate view list with at least THREE views for each stakeholder. Specify the level of details required for each view.

b) Using the Unified Modeling Language (UML), draw the diagram representing the order entry component. The order entry component diagram should show the customer places order and makes payment for the purchase of products or services offered by Me2U. State any assumption(s) about the component whenever necessary.

c) Differentiate between a platform independent model (PIM) and a platform specific model (PSM) in the Model Driven Architecture (MDA).

d) Describe how PIM could be transformed into PSM in the development of the All-in-OneApp.

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Question 4 (2 + 2 + 4 + 2 marks)

Automobile4Sale enterprise is a second-hand car dealer whose main business is selling second-hand cars or automobiles with its main sales office located in the vicinity of Klang Valley. It employs a number of salespeople to organize second-hand car road shows, invite potential buyers to the sales office or car road shows, and perform the necessary administrative work to complete the sales.

The management of Automobile4Sale would like to develop a computer-based system with the following main functions:

- To maintain the profile of the second-hand cars
- To maintain customers' profile (including potential customers)
- To maintain salespeople's profile
- To maintain sales information

a) Describe the software complexity that would be involved in building the above mentioned system.

b) Explain and illustrate with a diagram, the Jacobson use case technique that is used to handle the complexity of this system.

c) Identify the main problems with Jacobson's use case technique. Provide ONE possible approach to resolve these problems.

d) For the new system, a team of system architects planned the architectural model of the solution before assigning the work packages to the developers. The developers are required to develop the new software using object-oriented technology which includes integration with existing components from the different vendors as well.

Explain how the architectural components can be mapped to objects and classes using the following mapping types:

i. Object Agent view
ii. Functional view

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Question 5 (4 + 3 + 1 + 2 marks)

MyTransport Enterprise System is a computerized system that integrates a few subsystems such as Ticketing System, Financial Management System, Document and Record Management System, and Human Resource System.

a) Assuming that these different systems were developed by different vendors, discuss the TWO quality attributes to be achieved in the integration of these systems into an integrated, enterprise software system. Illustrate each quality attribute with a scenario diagram.

b) Design an interface diagram that shows the integration of these different subsystems of the MyTransport Enterprise System.

c) Describe how the subsystems of MyTransport Enterprise System can be integrated using the *gateway* architecture integration style.

d) Discuss an alternative architectural integration style that can be applied to integrate these different systems. Compare this against the gateway architecture integration style described in Question 5(c).

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